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**ARMY "NEW STANDARDS" PERSONNEL:
RELATIONSHIPS BETWEEN LITERACY LEVEL AND
INDICES OF MILITARY PERFORMANCE**

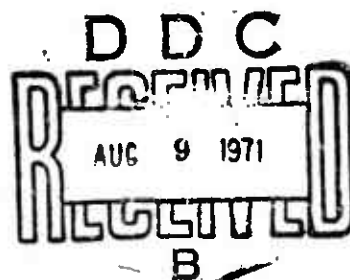
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Alexandria, Virginia

April 1971



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FOREWORD

This research was performed by the Human Resources Research Organization (HumRRO), Alexandria, Virginia, under Army Contract Number DAHC 19-70-C-0012, HumRRO Task Order 70-10, MIPR Number FX 2840-0-4170, Research Concerning Factors Relating to the Active Service and Reserve Service Performance of Project 100,000 Men and Other Military Separatees. Mrs. Jeanne Fites, Air Force Human Resources Laboratory (Manpower Development), Air Force Systems Command, served as Contract Monitor.

The research was conducted by HumRRO Division No. 7 (Social Science), Dr. Arthur J. Hoehn, Director. Dr. Hoehn served as Principal Investigator; the Work Unit Leader was Dr. Allan H. Fisher, Jr. Most of the statistical work was carried out by Mr. Gary J. Hartzler. Dr. George H. Brown of Division No. 7 participated in the writing of the report.

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This technical report has been reviewed and is approved.

George K. Patterson, Colonel, USAF
Commander

ABSTRACT

In 1966 the Department of Defense lowered entrance standards for military service. Men who enter the service as a result of this action are called "New Standards" men. In this research the relationship between literacy status of a sample of New Standards men after 23 months of Army service and various indices of military performance was determined. A second objective was to develop an equation for predicting 23-month literacy status. Analysis was carried out for 3,009 men on data extracted from the computerized Project 100,000 Data File. Literacy status at 23 months was found to be only slightly, although positively, related to most of the performance and status indices. A regression equation was developed for predicting 23-month literacy status on the basis of entry characteristics using half the sample and produced a multiple correlation of $+0.62$; a cross-validation test on the other half of the sample showed a correlation of $+0.60$.

SUMMARY

Fisher, A.H. *Army "New Standards" personnel: Relationships between literacy level and indices of military performance.* AFHRL-TR-71-12. Alexandria, Va.: Manpower Development Division, Air Force Human Resources Laboratory, April 1971.

Problem

The Armed Forces have been accepting low mental level (New Standards) personnel under Project 100,000 since October 1966. Over 15 percent of these New Standards men read below the fifth-grade reading level at entry into service. It was not known what effect low literacy status might have on military performance. This research was designed to determine the relationship between military performance and literacy status of a sample of Army New Standards men after 23 months of service, and to develop an equation for predicting 23 month literacy status.

Approach

According to current Army policy, a man with a reading test score below the fifth-grade level is considered to be in need of remedial instruction. Therefore, 23-month reading scores of approximately 3,000 Army men were dichotomized at the fifth-grade level, and the two groups compared on various indices of military performance. A regression equation was then developed for predicting literacy status on the basis of entry characteristics.

Results

Literacy status at 23 months was found to be only slightly related to most of the performance and status indices. The regression equation for predicting 23-month literacy status on the basis of entry characteristics using half the sample produced a multiple correlation of +.62; a cross-validation test on the other half of the sample showed a correlation of +.60.

Conclusions

Literacy status is only slightly related to most performance indices. It is possible to predict 23-month literacy status reasonably well on the basis of information obtained at the time of entry into service.

This summary was prepared by Jeanne B. Fites, Manpower Development Division, Air Force Human Resources Laboratory.

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Section I

INTRODUCTION

PROBLEM AND OBJECTIVES

In October 1966, the Department of Defense lowered its mental and physical standards for accepting men into military service. Since that date, men who score as low as the 10th percentile on the Armed Forces Qualification Test (AFQT) are acceptable, provided they also pass certain supplementary aptitude tests. Also, men who previously would have been ineligible because of physical defects are now considered acceptable if the physical defects are easily correctable in nature (e.g., overweight).

Personnel who entered the service as a result of the revised entrance standards are referred to as "New Standards" men. Not surprisingly, large numbers of these men are deficient in literacy, to varying degrees. It was not known what consequence low literacy would have upon their military effectiveness and general suitability for military service.

The HUMRRO research reported here had two objectives:

(1) To determine whether men with literacy scores above and below the fifth-grade level (at 23 months of service) differ significantly in various indices of military performance and status.

(2) To develop an equation, based upon data obtained at the time of entry into service, for predicting the literacy status of New Standards men after 23 months of service (without remedial training).

PROCEDURE

The general plan called for extracting and analyzing appropriate information from a Project 100,000 data base.¹ New Standards personnel, at the time of entry into service, are routinely given a variety of tests, including a literacy test. Literacy tests are again administered to substantial numbers of these men after they have been in the service for approximately two years. All test scores, as well as numerous other items of demographic, biographic, and military status information are entered into the computerized Project 100,000 data base.

¹The data base, including format and coding convention, is described in Department of Defense Instruction 1145.3; Subject: *Military Personnel Data File and Reporting Procedure for "Project One Hundred Thousand,"* December 23, 1968. The File contained records for approximately 143,000 Army lower mental standard personnel in June 1970.

For purposes of this study the Project 100,000 file as of June 20, 1970 was examined. Records were extracted for all men ($N = 3,009$) who had entered the Army from July to September, 1967. (Edit and Extract Procedures, Appendix I.)

CRITERION OF LITERACY

At the time of entering Army Service, New Standards men are given a variety of tests, including the USAFI Achievement Tests III, Form A (Abbreviated Edition), which includes a reading test, a word knowledge test, and an arithmetic computation test. Men who fall below specified minimum scores on this test are administered the USAFI Intermediate Test, Form D, which includes, among others, reading, word knowledge, and arithmetic computation tests. After approximately 23 months in service, substantial numbers of these men are administered an equivalent form of the same test. It is the 23-month reading scores that were used as the criterion of literacy in the research herein reported.

Section II

RELATIONSHIPS BETWEEN 23-MONTH LITERACY STATUS AND VARIOUS INDICES OF MILITARY STATUS AND PERFORMANCE

PROCEDURE

Of the 3,009 records extracted from the Project 100,000 data base, 2,384 men (79%) were found to have had between 22 and 24 months of active duty. These men form the base for this phase of the research and are referred to as having had 23 months of service. Their literacy scores, in terms of grade-level equivalents, are presented in Table 1.

Table 1

Distribution of 23-Month Grade
Equivalency Literacy Scores

23-Month Grade Equivalent	N	%
1	4	0.2
2	44	1.8
3	362	15.2
4	435	18.2
5	394	16.5
6	346	14.5
7	254	10.7
8	219	9.2
9	178	7.5
10	84	3.5
11	54	2.3
12	10	0.4
	2384	100.0

According to current Army policy, a man with a reading score below the fifth-grade level is considered to be in need of remedial instruction. Men in the present study entered service prior to initiation of the Army Preparatory Program in which remedial literacy training is included. However, because of the current Army policy on the minimum desirable level of literacy, the research staff decided to dichotomize the 23-month reading scores at the fifth-grade equivalency cut-off point. Norms for grade-level equivalency were

employed to convert test scores obtained from different forms to the single grade-level equivalency scores used as the criterion measures in the present study.²

For convenience, the group of men with 23-month literacy scores *at or above* the fifth-grade equivalency level will be referred to as having a "higher" literacy status. Those with scores *below* the fifth-grade equivalency level will be referred to as having a "lower" literacy status.

Indices of Military Status and Performance

The following indices were studied in this analysis:

- Pay Grade
- Military Occupation
 - (1) One-digit DoD code based on primary military occupation specialty (MOS).
 - (2) Two-digit DoD codes for the 15 most frequent primary MOSs and an "all others" category
- Performance Evaluation
 - (1) Military behavior (conduct)
 - (2) Professional performance (proficiency)
- Non-Judicial Punishment
- Court-Martial Convictions
- Reenlistment Eligibility
- Type of Discharge

The groups of men categorized as "higher" and "lower," respectively, in 23-month literacy status were compared in each of the indices listed. Data were analyzed by means of a contingency table analysis routine, BMD02S, which computes various nonparametric statistics as well as horizontal, vertical, and total percentages for the cross-tabulated cell entries.³

RESULTS

Pay Grade

The pay grade of each man was analyzed. The relationship of 23-month reading ability to pay grade appears in Table 2.

²Source: *Raw Score Conversion Table; USAFI Work Knowledge, USAFI Reading, and USAFI Arithmetic Computation Tests*, provided to Dr. Eli Flyer by Paul G. Berge, DoD U.S. Armed Forces Institute, Madison, Wisconsin, March 1969.

³*BMD Biomedical Computer Programs*, W.J. Dixon (ed.), University of California Press, Berkeley, 1970, pp. 341-356. The statistics include Chi square, contingency coefficient, and maximum likelihood estimates.

Table 2

Relationship of Literacy Status and Pay Grade

Pay Grade	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
E-1	7	0.8	18	1.2	25	1.0
E-2	23	2.7	43	2.8	66	2.8
E-3	88	10.4	169	11.0	257	10.8
E-4	534	63.2	995	64.7	1529	64.1
E-5 and above	193	22.8	314	20.3	507	21.2
	845	99.9	1530	100.0	2384	99.9

There was no significant relationship of pay grade to 23-month literacy status for these personnel. Men with lower literacy status were just as likely to have attained higher pay grades as were men with higher literacy status.

Military Occupation

The primary military occupational skills of personnel were analyzed by two approaches to determine the relationship of job classification to literacy at 23 months. The results for an analysis based on the nine major DoD categories appear in Table 3.

Table 3

Relationship of Literacy Status and Major DoD Occupations

DoD Occupational Category		Literacy Status					
		Lower		Higher		Total	
Code	Title	N	%	N	%	N	%
0	Infantry, Gun Crew	324	38.3	534	34.7	858	36.0
1	Elec. Equip. Repairman	27	3.2	44	2.9	71	3.0
2	Comm. & Intell.	31	3.7	79	5.1	110	4.6
3	Medical & Dental	5	0.6	11	0.7	16	0.7
4	Other Tech. & Allied Spec.	4	0.5	4	0.3	8	0.3
5	Admin. Spec. & Clerks Clerks	30	3.6	131	8.5	161	6.8
6	Elec./Mech. Equip. Repairman	87	10.3	148	9.6	235	9.9
7	Craftsmen	27	3.2	29	1.9	56	2.3
8	Service & Supply	140	16.4	190	12.3	330	13.8
Unknown		170	20.1	369	24.0	539	22.6
		845	99.9	1539	100.0	2384	100.0

There was a statistically significant relationship ($p < .001$) between literacy status and military occupation for these job categories. However, from a practical standpoint, the differences were of minor magnitude (e.g., 5% or less).

Data were also analyzed for the 15 most frequent primary military occupational skills assigned to Army lower mental standard personnel.⁴ This is a re-classification of the same basic data (PMOS) and the results are shown in Table 4.

Table 4
Relationship of Literacy Status and the Most Frequent
Military Occupations of New Standards Personnel

DoD Occupational Category		Literacy Status					
		Lower		Higher		TOTAL	
Code	Title	N	%	N	%	N	%
01	Infantry	199	23.6	338	22.0	537	22.5
80	Food Service	76	9.2	97	6.3	175	7.3
04	Artillery, Gunnery	54	6.4	98	6.4	152	6.4
55	Supply & Logistics (Clerical)	25	3.0	96	6.2	121	5.1
62	Wire. Comm.	27	3.2	70	2.5	97	4.1
61	Auto. Repair	38	4.5	57	3.7	95	4.0
81	Motor Transport	38	4.5	55	3.6	93	3.9
03	Combat Engineering	53	6.3	64	4.2	117	4.9
25	Combat Operations Control	24	2.8	56	3.6	80	3.4
64	Armament & Munitions Repair	5	0.6	4	0.3	9	0.4
60	Aircraft Repair	3	0.4	8	0.5	11	0.5
82	Material Receipt, Storage & Issue	14	1.7	15	1.0	29	1.2
20	Radio & Radio Code	4	0.5	17	1.1	21	0.9
02	Armor & Amphibious	18	2.1	34	2.2	52	2.2
51	Administration (Clerical)	3	0.4	22	1.4	25	1.0
	All Others	262	30.8	508	33.0	770	32.2
		845	100.0	1539	100.0	2384	100.0

There was also a statistically significant relationship ($p < .001$) between 23-month literacy status and the holding of one of the 15 most frequently assigned MOSs. Men

⁴Project One Hundred Thousand: Characteristics and Performance of "New Standards" Men, Office Secretary of Defense, Assistant Secretary of Defense (Manpower and Reserve Affairs), December 1969, p. 34.

with higher literacy scores were more likely to be in specialties such as supply and logistics (clerical), and less likely to be in food services. The absolute percentage differences are minor (less than 5%).

Performance Evaluation

Information on both conduct and proficiency ratings was available for analysis. It should be noted that these ratings have little variability; they are highly concentrated in the "Excellent" category. The results of the analysis of the relationship of literacy status to conduct (military behavior) ratings appear in Table 5.

Table 5
Relationship of Literacy Status and
Military Behavior Ratings

Rating Category	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
Excellent	723	96.4	1334	95.3	2057	95.7
Good	18	2.4	43	3.1	61	2.8
Fair	7	0.9	10	0.7	17	0.8
Unsatisfactory	2	0.3	13	0.9	15	0.7
	750	100.0	1400	100.0	2150	100.0

There was no significant relationship between the conduct ratings and the literacy criterion. Men with higher scores on the literacy tests were no more likely to have received high conduct ratings than men with lower scores. This finding was consistent with the previous finding on pay grade attainment.

An analysis was also made of the relationship of 23-month literacy status and proficiency, as measured by the professional performance ratings. Results are given in Table 6.

Table 6
Relationship of Literacy Status and
Professional Performance Ratings

Rating Category	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
Excellent	722	96.3	1339	95.6	2061	95.9
Good	16	2.1	40	2.9	56	2.6
Fair	11	1.5	10	0.7	21	1.0
Unsatisfactory	1	0.1	11	0.8	12	0.6
	750	100.0	1400	100.0	2150	100.0

There was no significant relationship between these proficiency ratings and the literacy criterion. Men with lower literacy scores were just as likely to have received high proficiency ratings as were men with higher scores. This is consistent with the previous findings for conduct ratings and pay grade attainment.

Non-Judicial Punishments

The classification of non-judicial punishments includes minor offenses such as traffic violations, unauthorized absences, lateness, and violation of curfew. The punishment *per se* typically consists of loss of privileges, or extra duty. The relationship between the number of reported non-judicial punishments and literacy level at 23 months is given in Table 7.

Table 7
Relationship of Literacy Status and
Number of Non-Judicial Punishments

Rating Category	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
None	655	87.0	1223	87.4	1878	87.2
One	64	8.5	112	8.0	176	8.2
Two	28	3.7	51	3.6	79	3.7
Three or More	8	0.8	14	1.0	20	0.9
	753	100.0	1400	100.0	2153	100.0

There was no significant relationship between literacy level and number of non-judicial punishments reported.

Court-Martial Convictions

These convictions are given for serious offenses, for example, robbery, striking a superior, and desertion. Punishments include confinement in a stockade or disciplinary barracks. The relationship of number of reported court-martial convictions and reading status at 23 months appears in Table 8.

There was no significant relationship between 23-month literacy scores and number of court-martial convictions.

Reenlistment Eligibility

A man is ordinarily considered eligible for reenlistment if he meets specified minimum scores on certain aptitude tests. However, his commanding officer has the authority to pronounce him *ineligible*, in spite of test scores, if he sees fit to do so.

Table 8

**Relationship of Literacy Status and
Number of Court-Martial Convictions**

Number of Court-Martial Convictions	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
None	738	98.0	1359	97.1	2097	97.4
One	14	1.9	36	2.6	50	2.3
Two	1	0.1	2	0.1	3	0.1
Three or More	—	—	3	0.1	3	0.1
	753	100.0	1400	99.9	2153	99.9

Approximately 2,050 of the 2,384 men in the sample had been categorized as to reenlistment eligibility. An analysis was made of the relationship between reenlistment eligibility and literacy status at 23 months. The results are given in Table 9.

There was a statistically significant relationship ($p < .001$) between 23-month literacy status and reenlistment eligibility. Men with higher literacy scores were more likely to have been rated eligible for reenlistment.

Table 9

**Relationship of Literacy Status and
Reenlistment Eligibility**

Reenlistment Eligibility	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
Eligible	362	53.0	848	62.0	1210	59.0
Not Eligible	321	47.0	519	38.0	840	41.0
	683	100.0	1367	100.0	2050	100.0

Note: Base is 2,050 men for whom reenlistment eligibility had been determined.

Type of Discharge

Approximately 2,090 of the 2,384 men in the sample had been discharged as of the reporting date of the files. An analysis was made of the relationship between type of discharge and literacy status at 23 months. The results appear in Table 10.

There was no significant relationship between 23-month literacy status and type of discharge received. Virtually all men received honorable discharges.

Table 10
Relationship Between Literacy Status and
Type of Discharge

Type of Discharge	Literacy Status					
	Lower		Higher		Total	
	N	%	N	%	N	%
Honorable	695	99.7	1388	99.6	2083	99.7
General	1	0.1	1	0.1	2	0.1
Undesirable	1	0.1	2	0.1	3	0.1
Bad Conduct	—	—	1	0.1	1	*
Dishonorable	—	—	1	0.1	1	*
	697	99.9	1393	100.0	2090	99.9

Note: Base is 2,090 discharged men.

*Less than 0.1%.

Section III

DEVELOPMENT OF AN EQUATION FOR THE PREDICTION OF 23-MONTH LITERACY STATUS

This section of the report describes the development of a regression equation for predicting the 23-month literacy status of New Standards men on the basis of information obtained from them at the time of entering the service. It should be noted that in this phase of the research, the criterion to be predicted was the actual numerical scores on the reading test administered to each man after approximately 23 months of service. This test was an equivalent form of the test each man had received at the time of entering the service, the USAFI Intermediate Achievement Test (UIAT).

From the total of 3,009 records that had been extracted from the Project 100,000 data base, 462 were eliminated because of incomplete data, for example, missing reading test scores. Analysis showed that this group with incomplete data did not differ from the remainder of the sample on any major variable. The 2,527 men from whom data were complete were randomly divided into two subsets: (a) a validation sample ($N = 1,269$), and (b) a cross-validation sample ($N = 1,258$). The validation sample was used in developing the original equation.

PREDICTOR VARIABLES

The predictor variables consisted of certain test scores (at time of entering the service) and certain demographic characteristics. Scores on the following tests were included:

- (1) The USAFI Intermediate Achievement Test for Reading (Form D).
- (2) The USAFI Intermediate Achievement Test for Word Knowledge (Form D).
- (3) The USAFI Intermediate Achievement Test for Arithmetic Computation (Form D).
- (4) The Armed Forces Qualification Test (AFQT) a 60-minute speeded estimate of mental ability. In conjunction with education and the Army Qualification Battery (AQB) scores, this test is used to identify New Standards personnel. Four subtest scores are combined to yield a single composite score (percentile).⁵
- (5) Test AQB-GT—The AQB test of general technical aptitude.
- (6) Test AQB-GM—The AQB test of general maintenance aptitude.
- (7) Test AQB-MM—The AQB test of motor maintenance aptitude.
- (8) Test AQB-EL—The AQB test of electronics aptitude.

⁵The four AFQT subtest areas are (a) verbal, (b) arithmetic, (c) pattern analysis, and (d) shop mechanics. Certain of the aptitude area test scores are derived from weighted combinations of the AFQT subtests. Other aptitude area scores derive from the administration of additional tests.

- (9) Test AQB-IN—The AQB test of infantry aptitude.
- (10) Test AQB-CL—The AQB test of clerical aptitude.
- (11) Test AQB-AE—The AQB test of armor, artillery, and engineering aptitudes.

In addition to these tests, a variety of demographic characteristics are recorded for recruits. The following entry data variables were included in the original equation:

- Age at entry into the service
- Race
- Educational level at entry
- Civilian employment status
- Enlistee/Inductee
- Number of school grades failed/repeated
- Number of civil court convictions

Edit and reformat procedures were employed to transform the data for statistical analyses (Appendix I). All predictor variables were correlated with the criterion and with each other. These correlation coefficients are presented in Appendix II.

DEVELOPING THE ORIGINAL EQUATION

The primary objective of this phase of the research was the development of an equation to provide the best possible prediction of 23-month reading test scores. For this reason, all 18 predictor variables were included in the multiple regression analysis.

A modified version of a BMD forward selection multiple regression program, BMD02R⁶, was employed to generate the prediction equation. The regression weights for this equation are presented in Table 11.

A multiple R of +.62 was obtained using the 18 predictor variables. Appendix III contains details of the multiple regression analysis. The predictor variables that had the highest partial correlations with the criterion were: (a) Initial Word Knowledge, (b) Initial Reading Score, (c) Enlistee/Inductee Status⁷, and (d) AQB-GT.

CROSS-VALIDATION

Data from the cross-validation sample were used to evaluate the regression equation. Predicted 23-month literacy scores for each of 1,258 trainees were computed and correlated with actual 23-month reading scores. A correlation coefficient of +.60 was found. The difference between this correlation coefficient and the multiple R is minimal and attributable to shrinkage that occurs because of chance factors operative in the process of computing the multiple regression equation.

⁶BMD Biomedical Computer Programs, W.J. Dixon (ed.), University of California Press, Berkeley, 1970, pp. 258-269.

⁷Enlistees tended to have higher literacy scores than inductees.

Table 11
Regression Weights for the Prediction of
23-Month Literacy Scores

Predictor Variables	Regression Weights
Age at Entry	- 0.02798
Race	- 0.19849
Number of Grades Failed	- 0.02951
Civil Court Convictions	- 0.11301
AQB-GT	0.02182
AQB-GM	- 0.00043
AQB-MM	0.00506
AQB-EL	0.06837
AQB-IN	- 0.00377
AQB-CL	0.00800
AQB-AE	0.00196
AFQT Percentile	0.03991
Initial Word Knowledge	0.40045
Initial Reading Score	0.25250
Initial Arithmetic Comprehension	0.00175
Educational Level	0.00697
Employed as Civilian	0.10159
Enlistee/Inductee	0.43026
(Intercept Value	- 0.48654)

Section IV

SUMMARY AND CONCLUSIONS

PROBLEM

In 1966 the Department of Defense made a decision to lower somewhat its standards for accepting men into military service. Not surprisingly, large numbers of these "New Standards" men were relatively low in literacy skills. It was not known with certainty what effect their literacy status might have upon their performance in the service.

OBJECTIVES

The research herein reported had two objectives:

(1) To determine whether men with literacy scores above and below, respectively, the fifth-grade level (at 23 months of service) would differ significantly in various indices of military status and performance.

(2) To develop an equation, based upon information obtained at the time of entering the service, for predicting literacy status at 23 months.

APPROACH

The general plan called for extracting and analyzing information on Army personnel from computerized information in the Project 100,000 data base. This file contained, for all New Standards men, information concerning their scores on a variety of tests, and also various items of biographic and demographic information.

PROCEDURE

Approximately 3,000 records were extracted from the data file, all of men who had been in the Army approximately 23 months. On the basis of their 23-month literacy scores, they were categorized as either above or below the fifth-grade level. Statistical analyses were carried out to determine whether those who were "higher" or "lower" in literacy status differed significantly in various indices of military performance and status.

The other phase of the research herein reported sought to develop the best possible equation for predicting 23-month literacy status (Reading Test Scores) on the basis of information obtained at the time men enter the service. A multiple regression equation using 18 predictor variables was developed on a randomly selected sample of about half of the men ($N = 1,269$) of the study population; the other half ($N = 1,258$) was used to cross-validate the results.

RESULTS

(1) There was no significant relationship between 23-month literacy status and the following indices:

- Pay grade
- Conduct ratings
- Proficiency ratings
- Number of non-judicial punishments
- Number of court-martial convictions
- Type of discharge

(2) There was a minor, albeit statistically significant ($p < .001$), relationship between literacy status and primary military occupation specialty. Men with higher literacy scores were somewhat more likely to have clerical jobs and less likely to have food service jobs.

(3) A significant relationship ($p < .001$) was found between reenlistment eligibility and literacy status; men with higher literacy status were more likely to have been judged eligible for reenlistment.

(4) A multiple correlation coefficient of +.62 was obtained between 18 predictor variables and the criterion of 23-month literacy score.

(5) Cross-validation produced a multiple R of +.60.

(6) Regression weights for predicting literacy scores after 23 months of service are presented in the report. The main predictors were (a) Initial Word Knowledge, (b) Initial Reading Score, (c) Enlistee/Inductee Status, and (d) AQB-GT.

CONCLUSIONS

(1) It appears that for the sample studied, literacy status had little or no relationship with most indices of military performance and status. In evaluating these results it should, however, be kept in mind that the study is limited to New Standards men, the large majority of whom are assigned to jobs which do not require high verbal ability.

(2) It is possible to predict 23-month literacy status reasonably well on the basis of information obtained at the time of entry into the service.

Appendix I
EDIT AND EXTRACT PROCEDURES

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PACE Literacy Study Transgenerator
Program Description

Purpose: Designed to edit and transgenerate both alpha and numeric input data extracted from Project 100,000 Army files to numeric grouped codes for use with the BIOMED programs.

Program Designation: PACE-6

Programmer: Gary J. Hartzler

References: a) Department of Defense Instruction Number 1145-3 dated December 23, 1968. Subject: Military Personnel Data File and Reporting Procedures for "Project One Hundred Thousand"

Detailed Description: PACE-6 reads an extract from the Army "Project One Hundred Thousand" file described in reference (a) and produces, record for record, an edited file containing both input record data and additional numeric codes generated for later use. Rules employed to extract the records are included. Rules used to generate desired numeric codes and the location of the codes on the output record are also listed. The new variables were coded to either dichotomize or ordinalize the data.

Input/Output Specifications: The input file is 270 BCD characters blocked 20 records/block with standard labels. The output file is 350 BCD characters blocked 20 records/block with standard labels.

Rules for Record Extraction: This literacy study population was extracted from the June, 1970, Army Project "One Hundred Thousand" File. The records of all New Mental Standards men (not including Medically Remedial accessions) with valid initial reading test scores were checked for the presence of (a) valid Terminal Reading Test scores, and (b) valid 23-month Reading Test scores. Extract rules appear below.

<u>Input</u>	<u>Global Tests</u>	<u>9000 Test</u>	<u>3000 Test</u>
June 30, 1970 U.S. Army Project 100,000 File	Must be a New Mental Standards man (i.e., Medically Remedial) and have a valid initial Reading Test score	Must have a valid Terminal Reading Test score, but not a 23-month score	Must have a valid 23-month Reading Test score, but not a Terminal Reading Test score

All those men with (b) and not (a) are the men who did not receive training. These cases comprise the $N = 3000$ sample.

The following variables were generated for each record. Variables unique to the two populations are designated.

Output Variable	Tape Position	Coding Rules
Age	42-43	Date of Entry - Date of Birth, unless either is blank, then use Age at entry if it is valid. 25 = invalid
Race	53	1 = white 2 = Other
Ethnic Group	54	1 = Spanish American 2 = American Indian 3 = Oriental American 4 = Puerto Rican 5 = Filipino 6 = Hawaiian 7 = Eskimo 8 = Aleutian 9 = Unknown 0 = Not Applicable
School Grades Failed Or Repeated	57	0-8 Number; 9 = Unknown
Civil Court Convictions	58	0-8 Number; 9 = Unknown
AQB Test Scores (7 Tests)	59-79	0-199 Test Score; 999 = Unknown
AFQT	80-81	1-98 AFQT Score; 99 = Unknown
Pay Grade	165	1-8 Latest Pay Grade; 9 = Unknown
Primary MOS (1 digit DoD designation)	181	0-9
Performance Evaluation A and B	195,197	1 = Excellent, 2 = Good, 3 = Fair 4 = Unsatisfactory, 5 = Unknown
Non-judicial Punishments	204	0-8 Number; 9 = Unknown
Court-Martials	205	0-8 Number; 9 = Unknown
Discharge Type	247	1 = Honorable, 2 = General, 3 = Undesirable, 4 = Bad Conduct, 5 = Dishonorable, 6 = Not Applicable, 7 = Unknown

Output Variable	Tape Position	Coding Rules
Reenlistment Eligibility	248	0 = Not Applicable, 1 = Not Eligible, 2 = Eligible, 9 = Unknown
Grade Equivalent Score on Initial Word Knowledge Test	254-256	.1-12.9 Equivalent grade level of Score Achieved; 0 = Unknown
Grade Equivalent Score on Initial Reading Test	257-259	.1-12.9; Note: Extract rules preclude unknown values.
Grade Equivalent Score on Initial Arithmetic Test	260-262	.1-12.9 0 = Unknown
Grade Equivalent Score on 23-month Reading Test	266-268	0-12.9; Note: N = 3000 extract rules preclude unknown values.
Grade Equivalent Score on termination of Remedial Training Reading Test	266-268	0-12.9; Note: N = 9000 extract rules preclude unknown values.
Difference Between Initial and Follow-up Reading Test Score	276-279	-12.0 to +12.0
Final Reading Score of Fifth Grade or Higher	284	1 = Yes; 0 = No; Note: Computed from follow-up reading score.
Geographic Region (Census)	285	0-9 by State of Record
Highest year of education completed (Grouped)	287	1 = Non-High School Graduate, 2 = HS Graduate, 3 = Some College, 4 = College Graduate, 5 = Unknown
Recruiting Region	288	1, 3, 4, 5, 6, by State of Record
Geographic Region	289	0-4 Macro of Census Regions
15 Most Prevalent Primary MOS in Army	313-314	1 = Infantry, 2 = Food Service, 3 = Artillery, 4 = Supply and Logistics, 5 = Wire Communications, 6 = Automotive Repair, 7 = Motor Transport, 8 = Combat Engineering, 9 = Combat Operations Control, 10 = Armament Repair, 11 = Aircraft Repair, 12 = Material Storage and Issue, 13 = Radio and Radio Code, 14 = Armor, 15 = Administration (Clerical), 16 = Other
Enlistee/Inductee	318	0 = Inductee, 1 = Enlistee, 9 = Other
Separated	319	1 = Yes, 0 = No

Output Variable	Tape Position	Coding Rating
Employed at Entry to Service	315	1 = Yes (weekly salary greater than 0); 0 = No
Length of Service in months	316-317	If date of Separation exists, Value = Date of Separation minus Date of Entry: else use As-of-Date Minus Date of Entry. 99 = Unknown
Record Valid for Regression Validity Test Indicator	290	1 = Yes, 0 = An invalid code exists among the following: HVEC, CCC, GFR, AQB, AFQT, AGE, and Grade Equivalent Test Scores.

Appendix II

INTERCORRELATIONS

List of Variables

<u>Variable Number</u>	<u>Variable</u>
1	Age at Entry
2	Race
3	Number of Grades Failed or Repeated
4	Number of Civil Court Convictions
5	AQB-GT
6	AQB-GM
7	AQB-MM
8	AQB-EL
9	AQB-IN
10	AQB-CL
11	AQB-AE
12	AFQT Percentile
13	Initial USAFI Word Knowledge Score
14	Initial USAFI Reading Score
15	Initial USAFI Arithmetic Comp. Score
17	Educational Level at Entry
24	Employed as a Civilian
25	Enlistee/Inductee
16	23-Month Reading Score (Criterion)

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SELECTION NO. 1- 1

CORRELATION COEFFICIENTS

NOTE: A CORRELATION OF -9.9999 INDICATES THAT ONE OR BOTH VARIABLES HAS A VARIANCE OF ZERO.

VARIABLE NO. 1	1.00000	0.05831	-0.09054	0.08252	-0.00274	0.01067	-0.00658	-0.00527	-0.10926	-0.11978
	-0.01201	0.00821	0.02142	-0.05013	-0.11382	0.09304	0.32538	-0.36250	-0.07056	
VARIABLE NO. 2	0.05831	1.00000	-0.21923	-0.06045	0.04546	-0.24676	-0.14318	-0.17711	0.03378	-0.06668
	-0.13079	-0.19438	-0.00416	-0.03432	-0.02158	0.35152	-0.05399	-0.06829	-0.07712	
VARIABLE NO. 3	-0.09054	-0.21923	1.00000	0.02096	-0.08408	0.18016	0.09460	0.07310	-0.03708	-0.06306
	0.04417	0.08992	-0.10800	-0.08760	-0.07569	-0.28514	0.02963	0.02863	-0.05120	
VARIABLE NO. 4	0.06252	-0.06045	0.02096	1.00000	0.04668	0.05979	0.03469	0.00683	0.00798	0.06378
	0.05947	0.07538	0.04897	0.07740	0.00193	-0.10065	0.02168	-0.04826	0.00964	
VARIABLE NO. 5	-0.00274	0.04546	-0.08408	0.04668	1.00000	-0.52678	-0.06072	0.01721	0.30070	0.53326
	0.09338	0.28909	0.50490	0.44905	0.36649	0.09155	0.02907	0.05427	0.38590	
VARIABLE NO. 6	0.01067	-0.24676	0.18016	0.05979	-0.52678	1.00000	0.19887	0.15341	-0.17230	-0.26004
	0.06677	0.39395	-0.38358	-0.28554	-0.27012	-0.30128	0.02665	0.03809	-0.20068	
VARIABLE NO. 7	-0.00658	-0.14318	0.09460	0.03469	-0.06072	0.19887	1.00000	0.54754	0.03965	0.03815
	0.75222	0.00441	0.08101	0.11862	0.00784	-0.18672	0.04054	0.04806	0.12198	
VARIABLE NO. 8	-0.00527	-0.17711	0.07310	0.00683	0.01721	0.15341	0.54754	1.00000	0.03401	0.12585
	0.44655	0.08832	0.16760	0.22082	0.06403	-0.17290	0.00600	0.03477	0.19406	
VARIABLE NO. 9	-0.10926	0.03378	-0.03708	0.00798	0.30070	-0.17230	0.03965	0.03401	1.00000	0.18718
	0.11526	0.03517	0.10469	0.14513	0.18499	-0.02054	-0.02712	0.12317	0.09892	
VARIABLE NO. 10	-0.11978	-0.06668	-0.06306	0.06378	0.53326	-0.26004	0.03815	0.12505	0.18718	1.00000
	0.15464	0.16152	0.49243	0.46157	0.29428	0.10483	-0.02618	0.09419	0.37678	
VARIABLE NO. 11	-0.01201	-0.13079	0.04417	0.05947	0.09338	0.06677	0.75332	0.44655	0.11526	0.15464
	1.00000	-0.00038	0.23933	0.23434	0.06430	-0.13742	0.01537	0.09054	0.20946	
VARIABLE NO. 12	0.00821	-0.19438	0.08992	0.07538	0.28909	0.39395	0.00441	0.06832	0.03517	0.16152
	-0.00038	1.00000	0.04776	0.06790	0.03942	-0.29954	0.06117	0.09178	0.12717	

VARIABLE NO.13	0.02142	-0.00414	-0.10600	0.04897	0.50490	-0.38358	0.08101	0.16760	0.10469	0.49243
	0.23933	0.04776	1.00000	0.72365	0.33969	0.12476	0.01590	-0.02204	0.56290	
VARIABLE NO.14	-0.05013	-0.03432	-0.08760	0.07740	0.44905	-0.23554	0.11862	0.22082	0.14513	0.46157
	0.23434	0.06790	0.72365	1.00000	0.40769	0.10299	0.00087	-0.00085	0.53253	
VARIABLE NO.15	-0.11352	-0.02158	-0.07569	0.00193	0.36649	-0.27012	0.00784	0.06463	0.18499	0.29428
	0.06430	0.03942	0.33969	0.40769	1.00000	0.16481	-0.04999	-0.05346	0.25036	
VARIABLE NO.17	0.09304	0.35152	-0.28514	-0.10065	0.09155	-0.30128	-0.18672	-0.17290	-0.02054	0.10483
	-0.13742	-0.29954	0.12476	0.10299	0.16481	1.00000	-0.05239	-0.18617	0.02251	
VARIABLE NO.24	0.32538	-0.05399	0.02963	0.02168	0.02907	0.02665	0.04054	0.00600	-0.02712	-0.02618
	0.01537	0.06117	0.01590	0.00087	-0.04999	-0.03239	1.00000	-0.21776	-0.03206	
VARIABLE NO.25	-0.36250	-0.06823	0.02863	-0.04826	0.05427	0.03809	0.04806	0.03477	0.12317	0.09419
	0.09054	0.09178	-0.02204	-0.00086	-0.05346	-0.18617	-0.21776	1.00000	0.09986	
VARIABLE NO.16	-0.07056	-0.07712	-0.05120	0.00964	0.38590	-0.20068	0.12198	0.19406	0.09892	0.37678
	0.20946	0.12717	0.56290	0.53253	0.25036	0.02251	-0.03206	0.09986	1.00000	

Appendix III
MULTIPLE REGRESSION INFORMATION

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SELECTION NO. 1- 1

SAMPLE SIZE 1269

NO. OF VARIABLES 19

DEPENDENT VARIABLE IS NOW NO. 16

COEFFICIENT OF DETERMINATION 0.3846

MULTIPLE CORR. COEFFICIENT 0.6202

SUM OF SQUARES ATTRIBUTABLE TO REGRESSION 2451.55957

SUM OF SQUARES OF DEVIATION FROM REGRESSION 3922.01123

VARIANCE OF ESTIMATE 3.13761

STD. ERROR OF ESTIMATE 1.77133

INTERCEPT (A VALUE) -0.48654

ANALYSIS OF VARIANCE FOR THE MULTIPLE

SOURCE OF VARIATION	LINEAR	REGRESSION	O.F.	SUM OF SQUARES
ONE TO REGRESSION	18	2451.55957	
OFVIATION ABOUT REGRESSION	...	1250	3922.01123	
TOTAL	1268	6373.57099	

VARIABLE NAME

MEAN
Age at Entry..... 20.73601
Race..... 1.46178
No. Grades Failed..... 0.57218
Civil Court Convictions.. 0.16391
AOB-GT..... 71.32072
AOB-GK..... 86.04233
AOB-MM..... 87.44444
AOB-EL..... 84.59100
AOB-TH..... 80.10007
AOB-CL..... 82.15523
AOB-AE..... 83.75728
APQT Percentile..... 13.90701
Initial Word Knowledge... 6.00181
Initial Reading Score ... 5.84634
Initial Arith. Comp. 6.08621
Educational Level..... 1.52088
Employed as Civilian 0.68243
Employee/Inductee 0.18203
23 Month Reading Score... 6.25894

COMP. CHECK ON FINAL COEFF. 0.43026

VARIABLES DELETED... 18 19 20 21 22 23

F VALUE

136.19775
43.4081

VARIABLE NAME	MEAN	STD. DEVIATION	REG. COEFF.	STD. ERROR OF REG. COEFF.	COMPUTED T VALUE	PARTIAL CORR. COEFF.	SUM OF SQ. ADDED	PROP. VAR. CUM.
Age at Entry.....	20.73601	2.07975	-0.02798	0.02760	-1.01385	-0.02866	31.72855	0.00498
Race.....	1.46178	0.49873	-0.19849	0.11128	-1.78368	-0.05039	34.08537	0.00535
No. Grades Failed.....	0.57218	0.90869	-0.02951	0.05831	-0.50607	-0.01431	36.16729	0.00567
Civil Court Convictions..	0.16391	0.62915	-0.11301	0.04074	-1.39993	-0.03954	38.9724	0.00614
AOB-GT.....	71.32072	9.21931	0.02182	0.00951	2.29443	0.06476	943.32406	0.14801
AOB-GK.....	86.04233	11.53081	-0.00043	0.00731	-0.05936	-0.00168	1.47647	0.00023
AOB-MM.....	87.44444	13.73786	0.00506	0.00609	0.83142	0.02351	127.38590	0.01999
AOB-EL.....	84.59100	13.60068	0.00837	0.00454	1.84545	0.05213	97.92125	0.01536
AOB-TH.....	80.10007	11.34344	-0.00377	0.00472	-0.79949	-0.02261	7.51643	0.00118
AOB-CL.....	82.15523	11.21662	0.00800	0.00571	1.40044	0.03958	169.85534	0.02665
AOB-AE.....	83.75728	13.90071	0.00196	0.00576	0.34094	0.00964	35.77379	0.00561
APQT Percentile.....	13.90701	2.94896	0.03991	0.02489	1.60397	0.04532	12.10500	0.00193
Initial Word Knowledge...	6.00181	1.84632	0.40045	0.04290	9.33496	0.23528	795.24839	0.12777
Initial Reading Score ...	5.84634	1.90076	0.25250	0.04027	6.27074	0.17464	124.12736	0.03548
Initial Arith. Comp.	6.08621	1.08587	0.00175	0.03114	0.03295	0.00093	0.31267	0.00009
Educational Level.....	1.52088	0.55224	0.00697	0.10894	0.06402	0.00181	0.25331	0.00204
Employed as Civilian	0.68243	0.46572	-0.10159	0.11502	-0.88323	-0.02497	5.31139	0.00083
Employee/Inductee 23 Month Reading Score...	0.18203 6.25894	0.38602 2.24198	0.43026	0.14435	2.98072	0.08401	27.87058	0.00437